glass for use as windows to control solar energy. Unlike the present invention, glass is not a printed circuit board and with all due respect, the Examiner has not shown any teaching or suggestion in the prior art to utilize the teachings in Greenberg on printed circuit boards.

Additionally, the method of Greenberg requires first sensitizing the surface of the substrate and then applying a copper film to the sensitized surface prior to contacting the copper film with a solution containing an ammoniacal silver salt and complexing agent. Greenberg recites that copper exposed on the substrate is likely to oxidize. Greenberg also teaches that the step of applying the copper film is accomplished by an electroless depostion.

As stated previously, the present invention is directed to a process improvement in printed circuit board manufacture. As recited in claim 1, the present invention teaches providing a protective coating on metal conducting surfaces formed on a bare board in the manufacture of printed circuit boards. Additionally, claim 1 of the present invention recites that the protective coating is provided on metal surface elements by contacting the metal surface elements with an aqueous displacement plating composition which exists in an aqueous vehicle, as opposed to ammonia as recited by Greenberg. As recited in the specification of the present application, the use of ammonia is disadvantageous because ammonia containing silver solutions are unstable and may be explosive as a result of azides which tend to form therein. Since Greenberg teaches applying a solution to a non-metallic glass surface by an electroless deposition, Greenberg clearly teaches away from the invention taught in claim 1 of the present invention. Furthermore, unlike the method of Greenberg where copper is exposed on the substrate and which oxidizes thereon, the present invention is directed to eliminating the oxidation of copper by ensuring properly adhered solder joints on metals.

The Office Action recites that Greenberg fails to teach the displacement coating of silver on copper with respect to bare boards for printed circuit boards. The Office Action further states that

Applicant's admitted state of the art (specification, pg. 1, line 8 - pg. 9, line 26) teaches that it is well known to use silver coatings on copper substrates utilized in printed circuit boards for protection against oxidation.

Applicant's recitation of the prior art in the instant application on page 1, line 8 - page 9, line 26 is directed to a discussion of the prior art with regard to bare boards used in the manufacture of printed circuit boards and which are fabricated and configured for the attachment of components such as legged components (e.g. resistors, transistors, etc.) and surface mount devices which are soldered upon the bare board. The discussion of the prior art further recites that the bare boards are produced comprising an insulating layer, a conducting circuit patter and conductive pads and/or through-holes for receiving legs of legged components. The through-holes for receiving legged components and pads on the board, which form the areas to which surface-mount components will be attached, are electrically conducting and are generally formed from copper. The discussion of the prior art recites that since copper tends to oxidize (to form copper oxide) which results in poor solderability, a protective layer is coated over the pads and/or through-holes to prevent the formation of a poorly solderable surface layer of copper oxide. The application recites that more than one way of preparing bare boards are known. While the Applicant's recitation of the prior art recites that processes are known which use silver coating on copper substrates, the recited prior art discloses silver coating using electroless techniques. The present application, in contrast, relates to a displacement immersion silver-plating process. A displacement immersion silver-plating process differs from an electroless process in that the silver coating forms on the surface of the metal by a simple displacement reaction due to the relative electrode potentials of the oxidizable metal of the surface to be protected and of the silver ions respectively.

The Office Action further states that it would have been obvious for one skilled in the art at the time the invention was made to have utilized the Greenberg silvering of copper on circuit boards as evidenced by Applicant's admitted state of the art (specification, pg. 1, line 8 - pg. 9, line 26) because of the expectation of achieving similar results and the fact that silvering of copper is well known in the circuit board art.

As recited, Greenberg is directed to the application of a metallic copper-silver film on transparent substrates, specifically large sheets or plates of flat glass for use as windows to control solar energy. Applicant's recitation of the prior art in its application discloses processes of silver plating on copper, however, these prior art processes are performed via an electroless process, which is significantly different from the displacement immersion process taught by the present invention.

Accordingly, Greenberg is not directed to improvements in printed circuit board manufacture and since Greenberg teaches away from the present invention as recited in claim 1, there is no motivation or suggestion to combine it with applicant's admitted state of the art. In view of the above, one skilled in the art would not be motivated to combine the teaching of Greenberg with applicant's admitted state of the art as there is no teaching or suggestion directed to a displacement immersion-silver plating process on bare boards used in the manufacture of printed circuit boards.

As such, claim 1 is not obvious in light of Greenberg in view applicant's state of the art, and is thus deemed allowable. As claims 3-9 and 11-17 depend either directly or indirectly from claim 1, these claims are allowable as well. Reconsideration and withdrawal of present rejection is respectfully requested and the claims advanced to allowance.

B. Claim 10 stands rejected under 35 U.S.C. §103(a) as obvious over Greenberg et al. in combination with Applicant's admitted state of the art (specification, pg. 1, line 8 - pg. 9, line 26) further in combination with Donley et al (U.S. Pat. No. 4,171,393).

The Office Action recites that Greenberg in combination with Applicant's state of the art (specification, pg. 1, line 8 - pg. 9, line 26) fails to teach a solution free of reducing agent. According to the Office Action, Donley teaches a plating bath requiring no reducing agent.

Claim 10 depends directly from claim 1 and incorporates the limitations of claim 1 therein. A such, the arguments above with regard to claim 1 are incorporated here and are equally applicable with regard to the rejection to claim 10. Accordingly, since claim 1 is not obvious under 35 U.S.C. §103 in light of Greenberg in combination with applicant's admitted state of the art, further combination with Donley does not render claim 10 unpatentable. Since claim 10 depends directly from claim 1, the rejection to this claim should be withdrawn as well.

The Office Action nevertheless recites that it would have been obvious for one skilled in the art at the time the invention was made to have modified Greenberg's coating bath by not incorporating a reducing agent as evidenced by Donley because of the expectation of achieving similar success. As mentioned previously, unlike the present invention which is directed to a displacement immersion silver plating process on bare boards in the manufacture of printed circuit boards, Greenberg is directed to a method of preparing a metallic copper silver film on non-metallic transparent substrates, specifically large sheets or plates of glass for use as windows to control solar energy. Donley, unlike the present invention that teaches providing the protective coating by a displacement immersion process, is directed to a method for electroless plating on a porous metal surface. As recited in the specification of the present application, the reaction in an electroless plating composition is effected by a catalyst. In contrast, a displacement plating or electroplating process as

taught by the present invention is effected by the passage of electric current through the electrolytic solution. In light of this, both Greenberg and Donley teach away from the present invention.

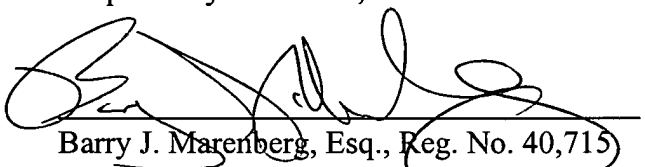
Accordingly, neither Greenberg nor Donley, alone or in combination teach the invention as recited in claim 10. Furthermore, since claim 10 depends from claim 1, which has been argued to be allowable over the cited prior art, and since claim 10 incorporates the limitations of claim1, claim 10 is allowable. Reconsideration and withdrawal of the rejection to claim 10 is respectfully requested.

II. CONCLUSION

In view of the aforementioned remarks and amendments, the Applicants believe that each of pending claims 1-25 is in condition for allowance. Reconsideration, withdrawal of the rejections, and passage of the case to issue is respectfully requested.

If, upon receipt and review of this amendment, the Examiner believes that the present application is not in condition for allowance, the Examiner is respectfully requested to call Applicants' undersigned counsel at the number given below.

Respectfully submitted,



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